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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,483	11/28/2003	Anthony I-Chih Chou	FIS920030296US1	1034

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EXAMINER

GRAYBILL, DAVID E

ART UNIT PAPER NUMBER

2822

DATE MAILED: 07/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/724,483	Applicant(s) CHOU ET AL	
	Examiner David E. Graybill	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-15 and 21-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15 and 21-26 is/are allowed.
- 6) ☒ Claim(s) 1 and 3-14 is/are rejected.
- 7) ☒ Claim(s) 3 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claims 3 and 9 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. To further clarify, as admitted by applicant in the response filed 4-26-6, the scope of the claim 1 term "gate oxide" is limited to "silicon dioxide (SiO₂), silicon oxynitride (SiON), silicon nitride (SiN) or high-k."

In the rejections *infra*, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 6 and 12 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Jeong (6780715).

At column 7, line 8 to column 8, line 14, Jeong discloses method of forming different gate oxides on a semiconductor substrate, the substrate

having a top surface, a first area and second area which is distinct from the first area, comprising: forming a first gate oxide 74 on the top surface of the substrate; depositing a first layer of polysilicon 75 over the first gate oxide; forming a hard mask 76 on top of the first layer of polysilicon; forming a soft mask 77 covering the first gate oxide, first layer of polysilicon and hard mask in the first area of the substrate; removing the hard mask, the first layer of polysilicon and the first gate oxide in the second area of the substrate, leaving the second area exposed; stripping the soft mask; inherently cleaning the exposed second area of the substrate "etched selectively by using the first photoresist pattern layer 77 as a mask, so that the substrate 70 in the memory region 72 and the boundary area of the logic region 71 is exposed"; growing a second gate oxide 78 on the top surface of the substrate in the second area; and removing the hard mask; after removing the hard mask depositing a second layer of polysilicon 79 in both the first and second areas; wherein: the hard mask comprises a material selected from the group consisting germanium (Ge), silicon germanium (SiGe), amorphous carbon, SiO₂, Si₃N₄, and other materials that are easy to remove from a silicon wafer without leaving a residue; and wherein: the first gate oxide is thinner than the second gate oxide.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4, 5, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong (6780715).

Jeong is applied as applied to claim 1.

However, Jeong does not appear to explicitly disclose wherein: wherein the first gate oxide has a thickness of approximately 5-25 angstroms; wherein the first layer of polysilicon has a thickness of approximately 20-500 angstroms; the hard mask has a thickness of approximately 300-500 Angstroms; choosing an initial thickness for the hard mask to ensure that after stripping the soft mask, a thickness of greater

than approximately 15 angstroms of hard mask material remains in place on the substrate.

Notwithstanding, as cited, Jeong discloses that the first gate oxide thickness is a result effective variable. Moreover, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that, in view of the applied prior art, the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

To further clarify, the scope of the limitation, "choosing an initial thickness for the hard mask to ensure that after stripping the soft mask, a thickness of greater than approximately 15 angstroms of hard mask material

remains in place on the substrate" is not limited to a step of stripping the soft mask, and, a thickness of greater than approximately 15 angstroms of hard mask material remains in place on the substrate, because the language, "to ensure that after stripping the soft mask, a thickness of greater than approximately 15 angstroms of hard mask material remains in place on the substrate" is a statement of intended purpose of the hard mask thickness that does not appear to result in a manipulative difference between the claimed mask and the mask of Jeong. Further, because the mask of Jeong appears to have the same structure as the claimed mask, it appears to be inherently capable of being used for the intended purpose, and the statement of intended purpose does not patentably distinguish the claimed mask from the mask of Jeong. The manner in which a product operates is not germane to the issue of patentability of the product; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). Also, "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim."; Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). And, "Inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims."; In re Young, 25 USPQ 69 (CCPA 1935) (as

restated in *In re Otto*, 136 USPQ 458, 459 (CCPA 1963)). And, claims directed to product must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does [or is intended to do]." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990).

Claims 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong as applied to claim 1, and further in combination with Radens (6388294).

Jeong does not appear to explicitly disclose wherein the second gate oxide comprises a material selected from the group consisting of silicon dioxide (SiO₂), silicon oxynitride (SiON), silicon nitride (SiN) and high-k material; wherein the second gate oxide has a composition that is different than a composition of the first gate oxide.

Nonetheless, at column 3, lines 25-33 and column 5, lines 24-49, Radens discloses wherein a gate oxide 106 comprises silicon dioxide (SiO₂); wherein a second gate oxide 170 has a composition that is different than a composition of the first gate oxide. Moreover, it would have been obvious to combine this disclosure of Radens with the disclosure of Jeong because it would provide the second gate oxide of Radens and permit optimization of

thickness and formation conditions or different selected regions of the semiconductor substrate.

Claims 3, 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong as applied to claim 1, and further in combination with Radens (6388294).

Jeong does not appear to explicitly disclose wherein the second gate oxide is grown by a process selected from the group consisting of: rapid thermal oxidation (RTO) in NO, N₂O, NH₃, O₂ (500-1100 degrees C); plasma nitridation treatment on base oxide (25 - 800 degrees C); plasma oxidation; UV oxidation; and atomic layer deposition; and wherein the first gate oxide comprises a high-k material.

Nevertheless, at paragraph 6, Radens discloses wherein a gate oxide comprising a high-k material is grown by atomic layer deposition. Furthermore, it would have been obvious to combine this disclosure of Radens with the disclosure of Jeong because it would insure a uniform composition and thickness of the gate oxide.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong as applied to claim 1, and further in combination with Lin (6063760).

Jeong does not appear to explicitly disclose wherein during growing the step of growing the second gate oxide, a portion of the hard mask

becomes oxidized; and further comprising: removing the oxidized portion of the hard mask using an etch that will remove the oxidized portion of the hard mask without affecting the second gate oxide.

Notwithstanding, at 3, lines 4-24; and column 3, line 66 to column 4, line 19, Lin discloses during the step of growing a second gate oxide 30, a portion of the hard mask 22 becomes oxidized; and further comprising: removing the oxidized portion of the hard mask using an etch "water" that will remove the oxidized portion of the hard mask without affecting the second gate oxide. In addition, it would have been obvious to combine this disclosure with the disclosure of Jeong because it would it would prevent or minimize the first gate oxide from growing thicker.

Claims 15 and 21-26 are allowed.

Applicant's amendment and remarks filed 4-26-6 have been fully considered, are addressed by the rejections *supra*, and are further addressed *infra*.

Applicant traverses the 35 U.S.C. 112 rejection of claims 3 and 9 because, "although including nitride in the list of possible gate oxides may be opposed to its usual meaning, it is quite clear in the context of the patent application," and further cites portions of the instant specification which define gate oxide as, "suitably silicon dioxide (SiO₂), silicon oxynitride (SiON), silicon nitride (SiN) or high-k."

This traversal is deemed persuasive because it is consistent with the well-established axiom in patent law that a patentee or applicant is free to be his or her own lexicographer and may use terms in a manner contrary to or inconsistent with one or more of their ordinary meanings if the written description clearly redefines the terms. See, e.g., *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999), and MPEP 2173.05(a)III. Therefore, the scope of the claim term "gate oxide" is limited to the redefinition of the term in the specification, "suitably silicon dioxide (SiO₂), silicon oxynitride (SiON) silicon nitride (SiN) or high-k."

This traversal is respectfully deemed unpersuasive because

Applicant contends that Jeong does not disclose the limitations allegedly disclosed in the instant drawings.

This contention is respectfully deemed unpersuasive because Jeong is not necessarily applied to the rejection for a disclosure of these limitations.

Also, applicant argues that Jeong does not disclose a Ge hard mask.

This argument is respectfully deemed unpersuasive because the scope of the claims is not limited to a Ge hard mask, and Jeong is not necessarily applied to the rejection for this disclosure.

In addition, applicant alleges, "it will be nearly impossible to remove the oxidized hardmask or the hardmask itself without etching away 212 dielectric-2 [sic] as well."

This allegation is respectfully deemed unpersuasive because it is unsupported by proof or a showing of facts; hence, it essentially amounts to mere conjecture and it is of no probative value. See MPEP 716.01(c), and, *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989) (statement in publication dismissing the "preliminary identification of a human b - NGF - like molecule" in the prior art, even if considered to be an expert opinion, was inadequate to overcome the rejection based on that prior art because there was no factual evidence supporting the statement); *In re Beattie*, 974 F.2d 1309, 24 USPQ2d 1040 (Fed. Cir. 1992) (declarations of seven persons skilled in the art offering opinion evidence praising the merits of the claimed invention were found to have little value because of a lack of factual support); *Ex parte George*, 21 USPQ2d 1058 (Bd. Pat. App. & Inter. 1991) (conclusory statements that results were "unexpected," unsupported by objective factual evidence, were considered but were not found to be of substantial evidentiary value).

The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions relevant to the examination of the instant invention.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

For information on the status of this application applicant should check PAIR: Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.
The fax phone number for group 2800 is (571) 273-8300.

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A handwritten signature in black ink, appearing to read 'D E Graybill', written in a cursive style.

David E. Graybill
Primary Examiner
Art Unit 2822

D.G.

30-Jun-06